FINAL REPORT

Risk Based Corrective Action of Plantain and Yelibuiya Islands along with recommendations for mitigation of vulnerabilities

Abstract

This report explores the application of Risk-Based Corrective Action (RBCA) frameworks to address coastal erosion and flooding on Plantain and Yelibuiya Islands. Both islands face unique vulnerabilities exacerbated by climate change, including the loss of livelihoods, displacement, and damage to critical infrastructure. Additionally, socioeconomic factors such as inadequate healthcare, limited education, and resource scarcity intensify the challenges faced by these communities. The report evaluates RBCA's potential in mitigating these risks and provides detailed recommendations for sustainable development and climate resilience.

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1.0 Introduction

Plantain and Yelibuiya Islands, located along vulnerable coastal zones, are emblematic of the challenges posed by coastal erosion and flooding. These environmental issues have accelerated due to rising sea levels, changing precipitation patterns, and unsustainable land use practices. As predominantly rural communities, both islands depend primarily on fishing. The coastline changes and flooding due to mangrove deforestation, besides climate change-induced sea level rise, have increased the vulnerability of infrastructural loss leading to serious consideration of population migration. The International Organization for Migration, Freetown, Sierra Leone commissioned a study to assess the risk and design and assess mitigation measures using a Risk-Based Corrective Action (RBCA) approach.

This report explores the application of RBCA frameworks to address coastal erosion and flooding on the Plantain and Yelibuiya Islands. Both islands face unique vulnerabilities exacerbated by climate change, including the loss of livelihoods, displacement, and damage to critical infrastructure. Additionally, socioeconomic factors such as inadequate healthcare, limited education, and resource scarcity intensify the challenges faced by these communities. The report evaluates RBCA's potential to mitigate these risks and provides detailed recommendations for sustainable development and climate resilience.

2.0 Methodology

A mixed-methods approach was employed, combining field surveys, geospatial analysis, stakeholder interviews, and literature reviews. Data were analyzed within the RBCA framework to identify high-priority risks and feasible interventions. The methodology used addresses the primary objectives of this report:

- Assess the socio-environmental impacts of coastal erosion and flooding on the island communities.

- Identify vulnerabilities specific to Plantain and Yelibuiya Islands.

- Propose the application of RBCA frameworks to prioritize and implement mitigation strategies.

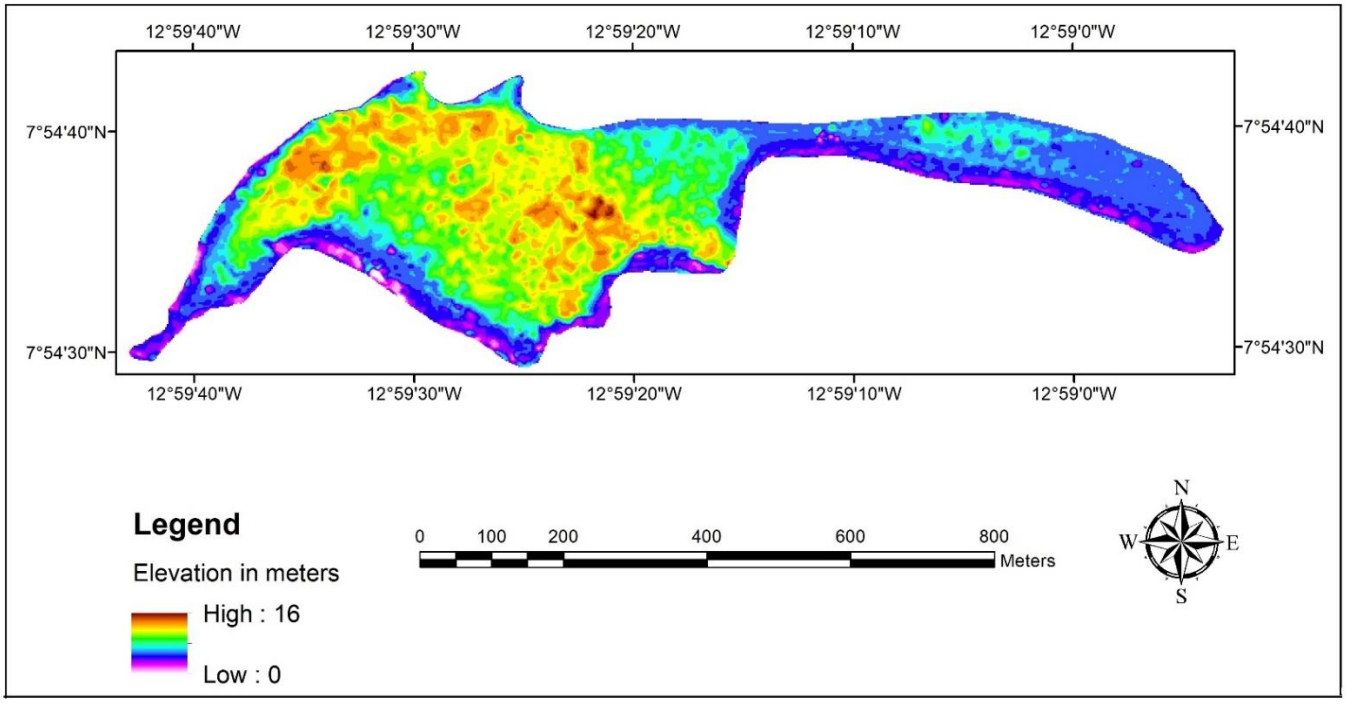
- Develop actionable recommendations for policymakers, NGOs, and other stakeholders.

3.0 Geographic and Socioeconomic Context

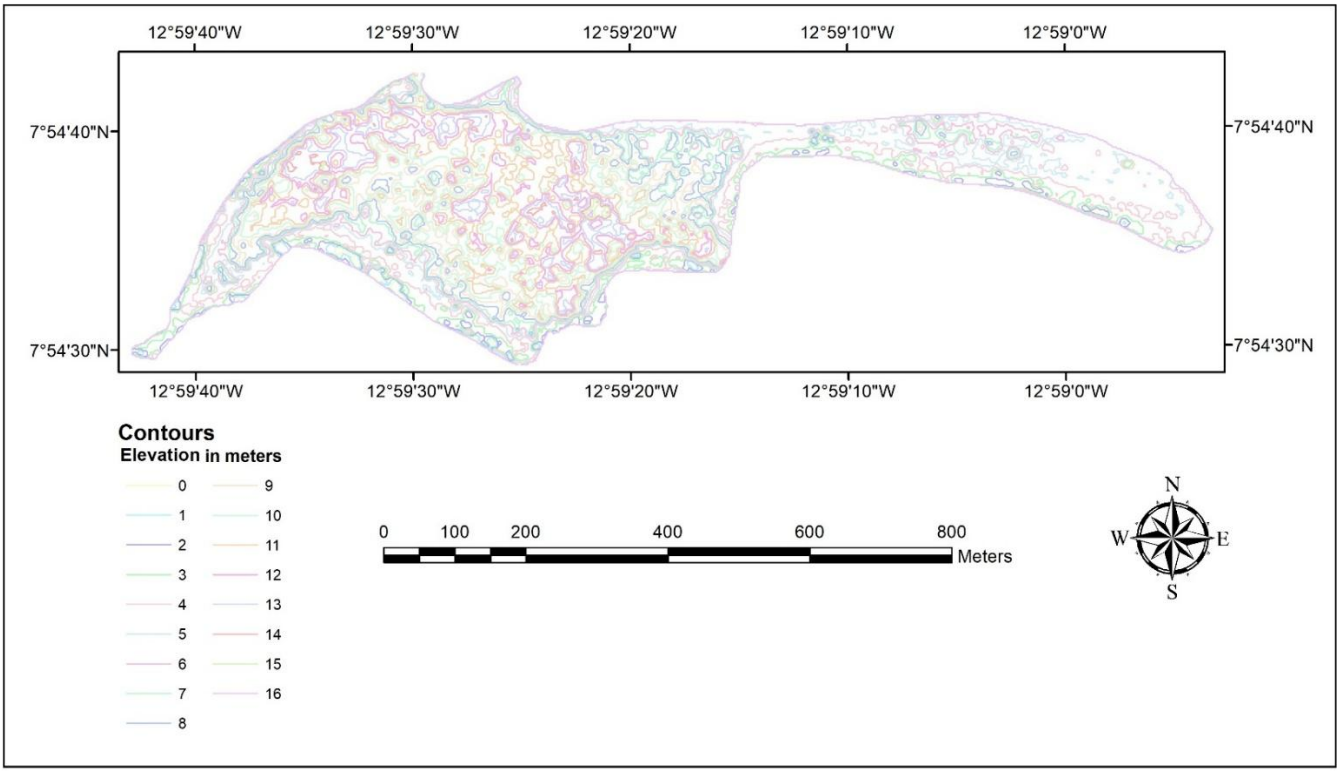
3.1 Geographic Overview

3.1.1 Plantain Island:

A low-lying island with elevation ranging from 0 – 16 m. Its coastline is primarily sandy, making it highly susceptible to erosion. The digital terrain model was developed for the island and is submitted as a separate report. However, for ease of readership, it is included in the report as Figure 1. The digital terrain model for the Plantain has been generated using KOMPSAT stereo images.



A. Digital Terrain Model of Plantain Island

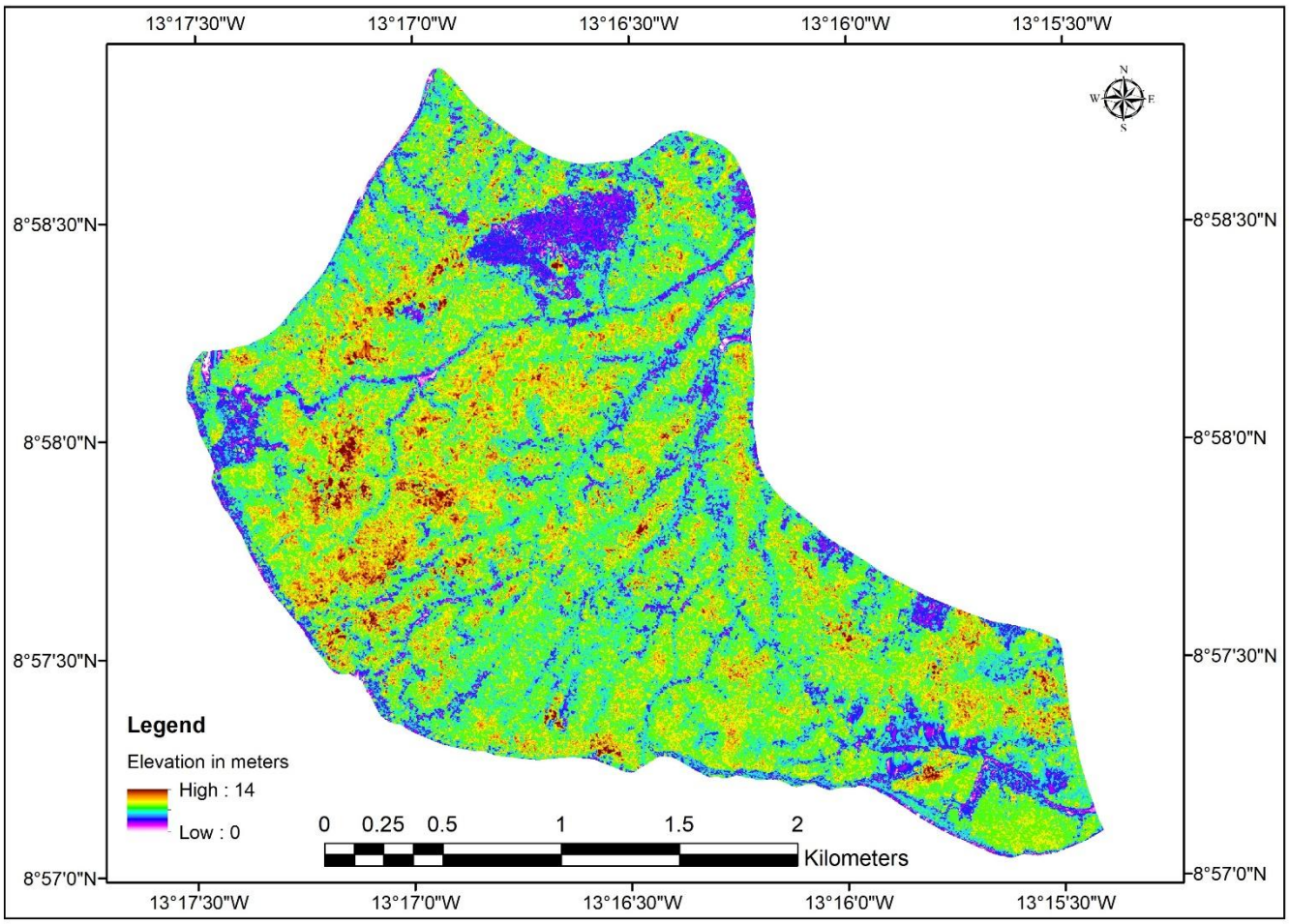


B. Contour map of Plantain Island.

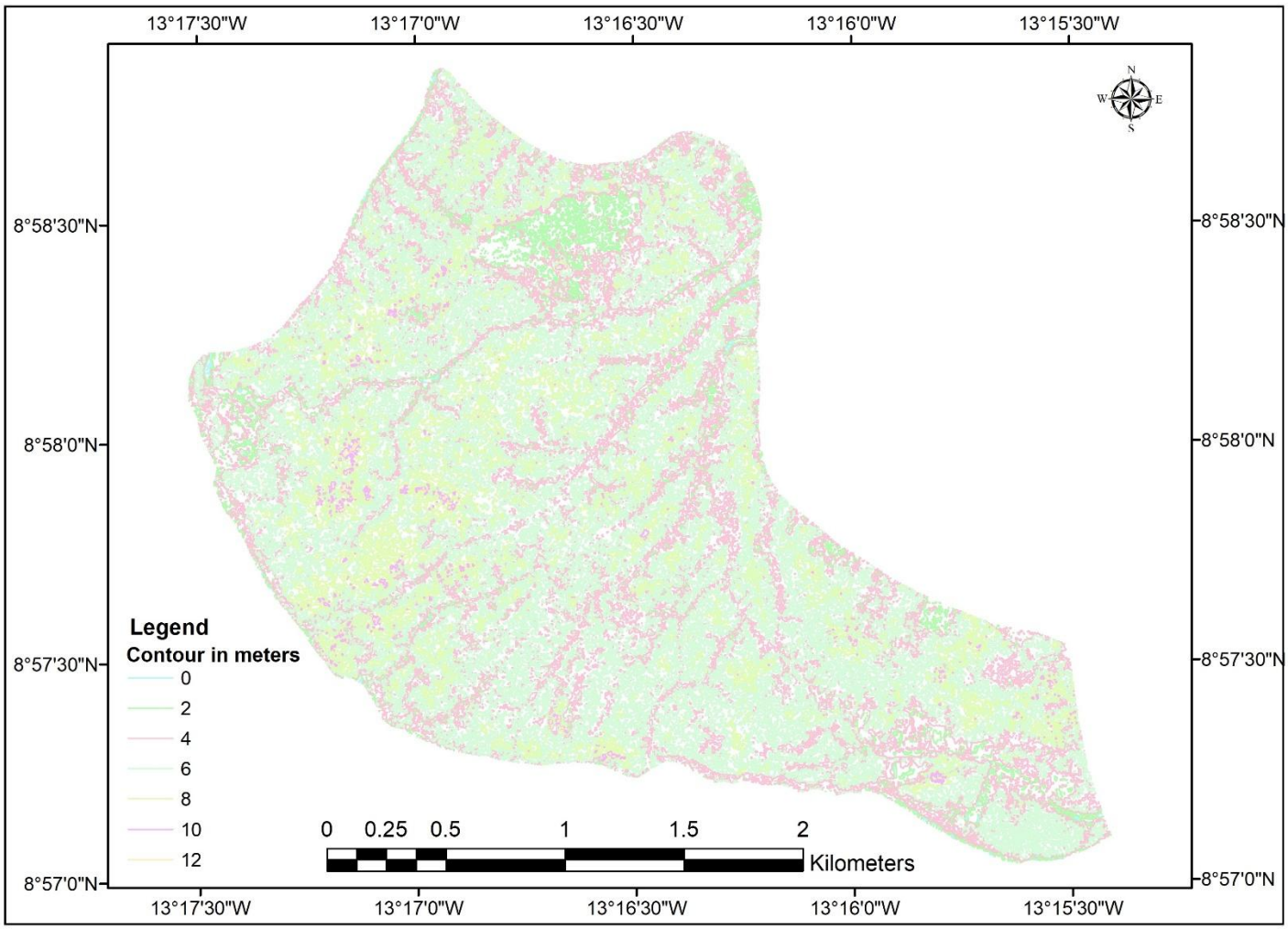
Figure 1. Digital Terrain Model for the Plantain Island.

3.1.2 Yelibuiya Island:

The digital terrain model and contour profiles were generated for Yelibuiya Island (Figure 2). The elevation varies between 0 – 14 m. A considerable portion of the island is a low-lying swampy area drained by various tributaries. Characterized by mangrove ecosystems and clayey soils, it faces frequent inundation during high tides and storm surges.



A. The Digital Terrain Model of Yelibuiya Island



B. Contour map of Yelibuiya Island

Figure 2. The topographic profile of Yelibuiya Island.

3.2 Demographic and Economic Profile

3.2.1 Plantain Island:

The population of approximately 5,800 primarily engaged in fishing and artisanal crafts. The island has limited infrastructure, an pier is under construction on the southern side. There is a school and limited healthcare facilities. There are no paved roads and drainage. The population is mostly engaged in fishing and related activities.

3.2.2 Yelibuiya Island:

There are about 5,000 inhabitants on the Island, with a mixed economy of fishing, small-scale agriculture, and trading. Infrastructure is limited with no sanitation and wastewater collection. Overall the facilities remain inadequate for large-scale disaster response.

3.3 Climate and Environmental Challenges

The area enjoys a tropical climate, usually warm and humid. The annual average rainfall between 1961 – 1990 is 2,746 mm. The rainy season is largely controlled by the movement of the tropical rain belt, Inter-Tropical Convergence Zone (ITCZ), which oscillates between the northern and southern tropics over a year.

3.3.1 Temperature:

The average annual temperature in the coastal region is 26.7°C. The lowest annual average temperature recorded was 25.4 in 1920, over the past 3 decades the annual average has remained over 26 °C.

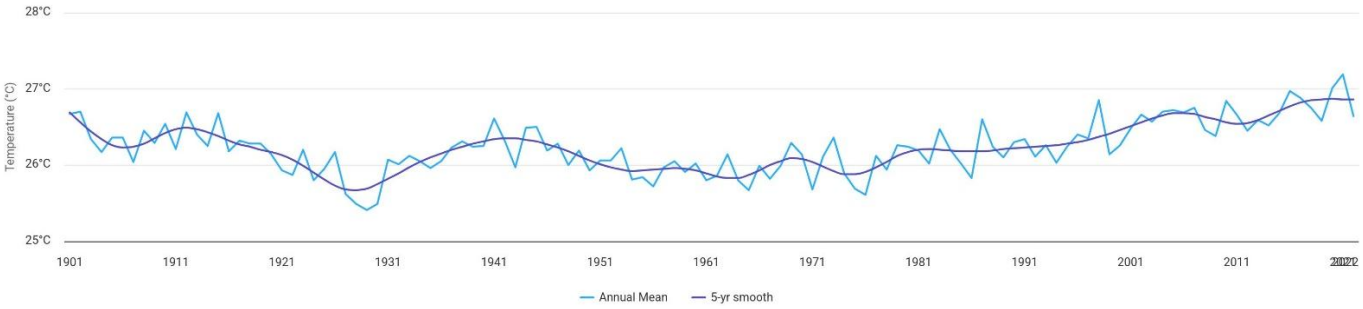


Figure 3. Mean Temperature of Sierra Leone between 1901 – 2022 [1]

3.3.2 Precipitation:

The study area is characterized by high precipitation with an average annual precipitation of over 2700 mm. July to September are months when maximum rainfall occurs with the highest precipitation in August (Figure 4).

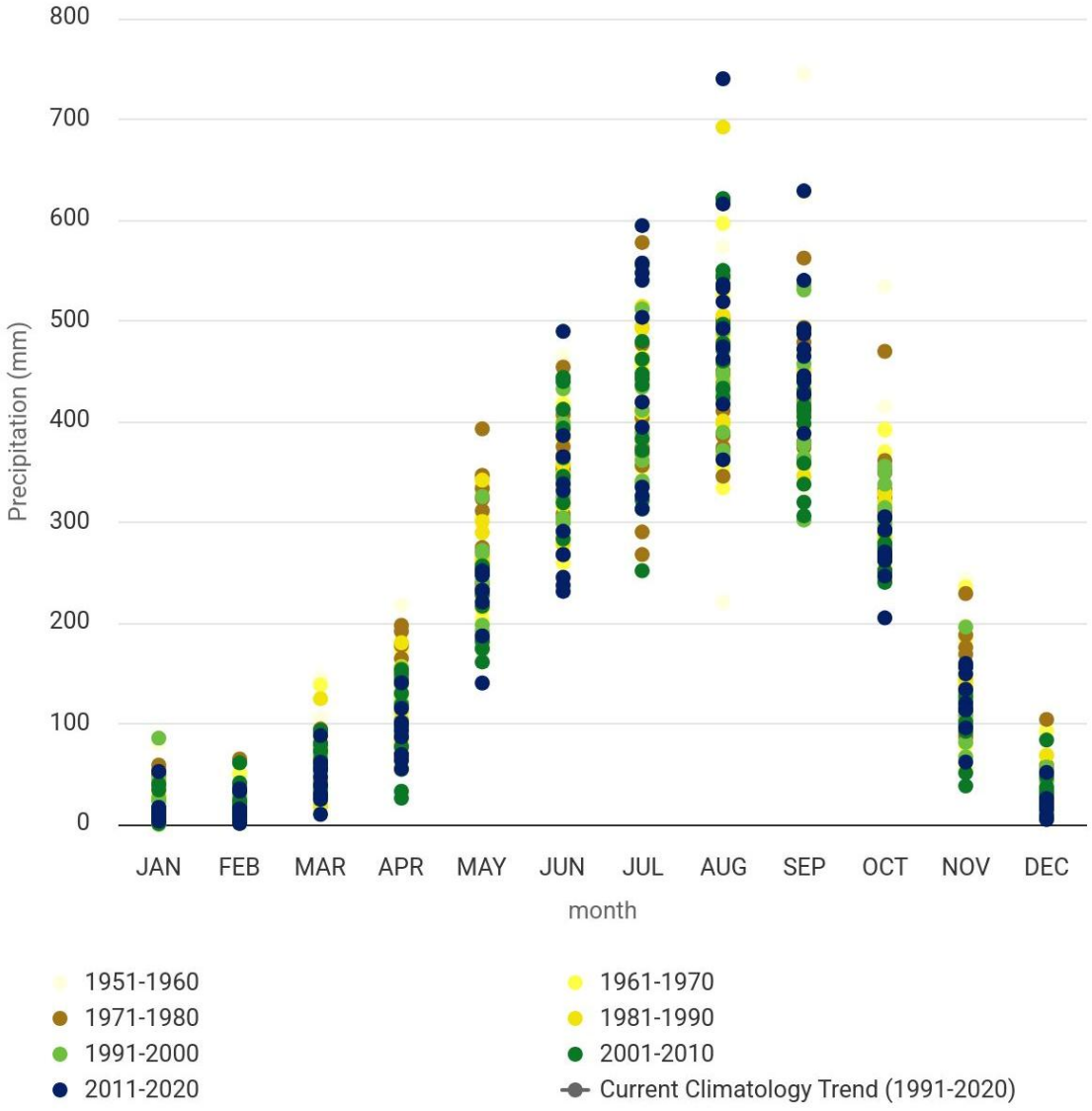


Figure 4. Variability and Seasonal Precipitation Trends (1951 – 2020) [1].

There have been claims of rising sea levels, there are suggestions of a 3 mm per year increase in sea level [1]. The claims of the International Monetary Fund Report suggest an increase of 0.5 – 0.78 m compared to the year 2000 (Figure 5) [2]. However, these are modeled outcomes and are unsubstantiated as no continuous reliable measurements are available.

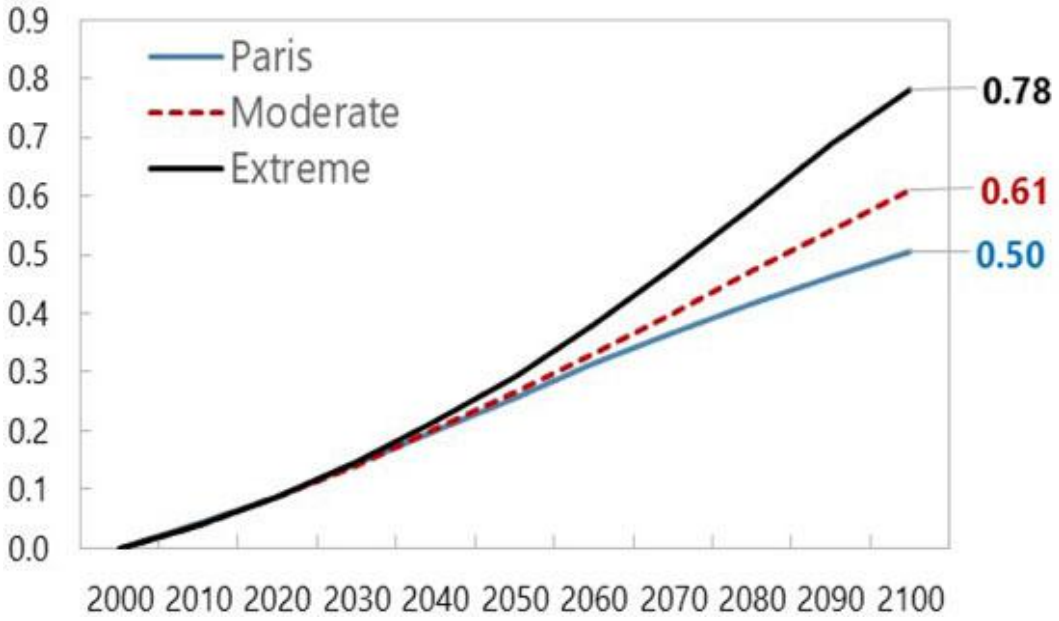


Figure 5. Sea level rise is expected based on different ***Representative Concentration Pathway*** *models 4.5 (Paris), 6.5 (Moderate), and 8.5 (Extreme) adopted from IMF Report 2024 [2].*

Increased frequency of extreme weather events such as tropical storms and flooding are perceived as climate-related natural disasters, leading to high rates of coastal erosion, with shoreline retreat averaging 2 meters per year in some parts of the Islands. The frequent flooding during rainy seasons and tidal surges have also negatively affected the infrastructure on both the Plantain and Yelibuiya Islands.

4.0 Impacts of Coastal Erosion and Flooding

4.1 Social Impacts

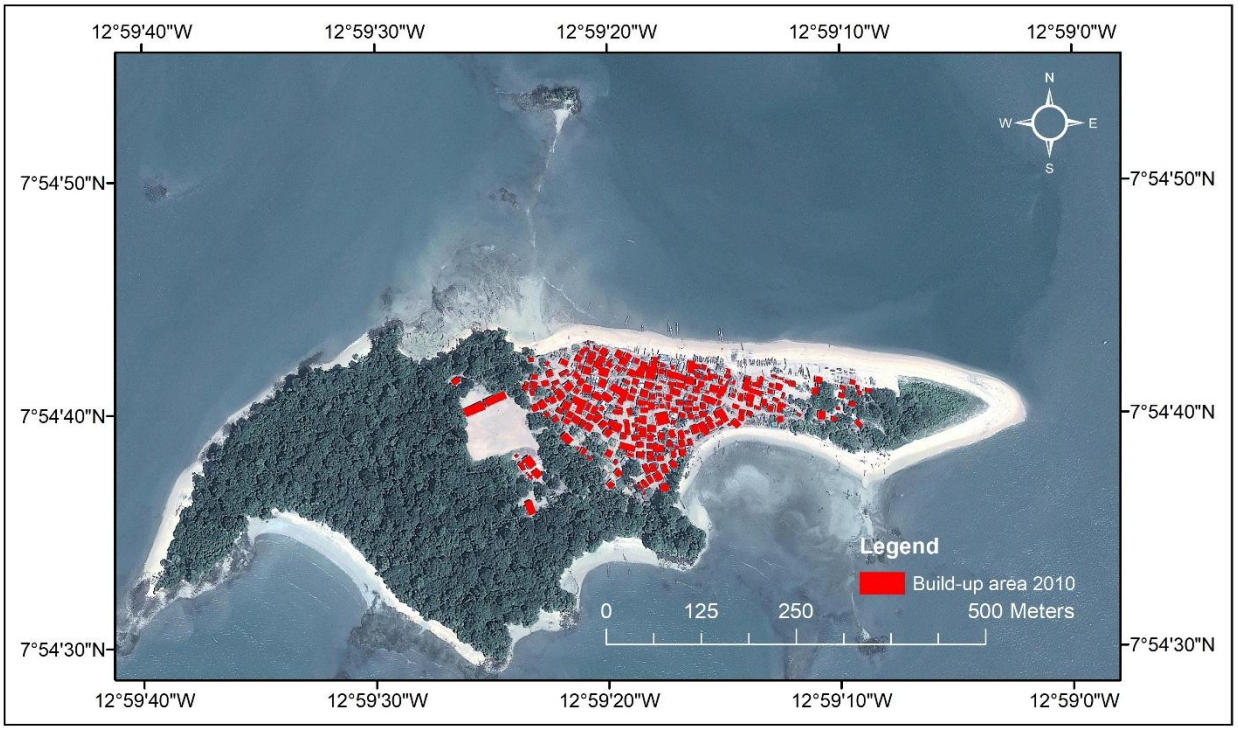
4.1.1 Displacement of Population:

The large-scale erosion and rising water levels have destroyed coastal infrastructure and led to the relocation of several households, a huge land mass lost on the north of Plantain and the submergence of Yelibuiya Island. Significant

displacement has led to reconstruction on both islands. The internal displacement can be observed on Plantain Island as a consequence of erosion (Figure 6). A significant population increase is also seen as an increase in the number of dwellings (Table 1).

Table 1. Temporal trend showing a change in built-up area in Plantain Island

Year	Build-up in sq meters	Build-up in sq kms	% increase in built-up area	Building number count
2024	21129.63	0.021	+18.58	364
2014	17818.62	0.017	+8.96	288
2010	16352.80	0.016		270



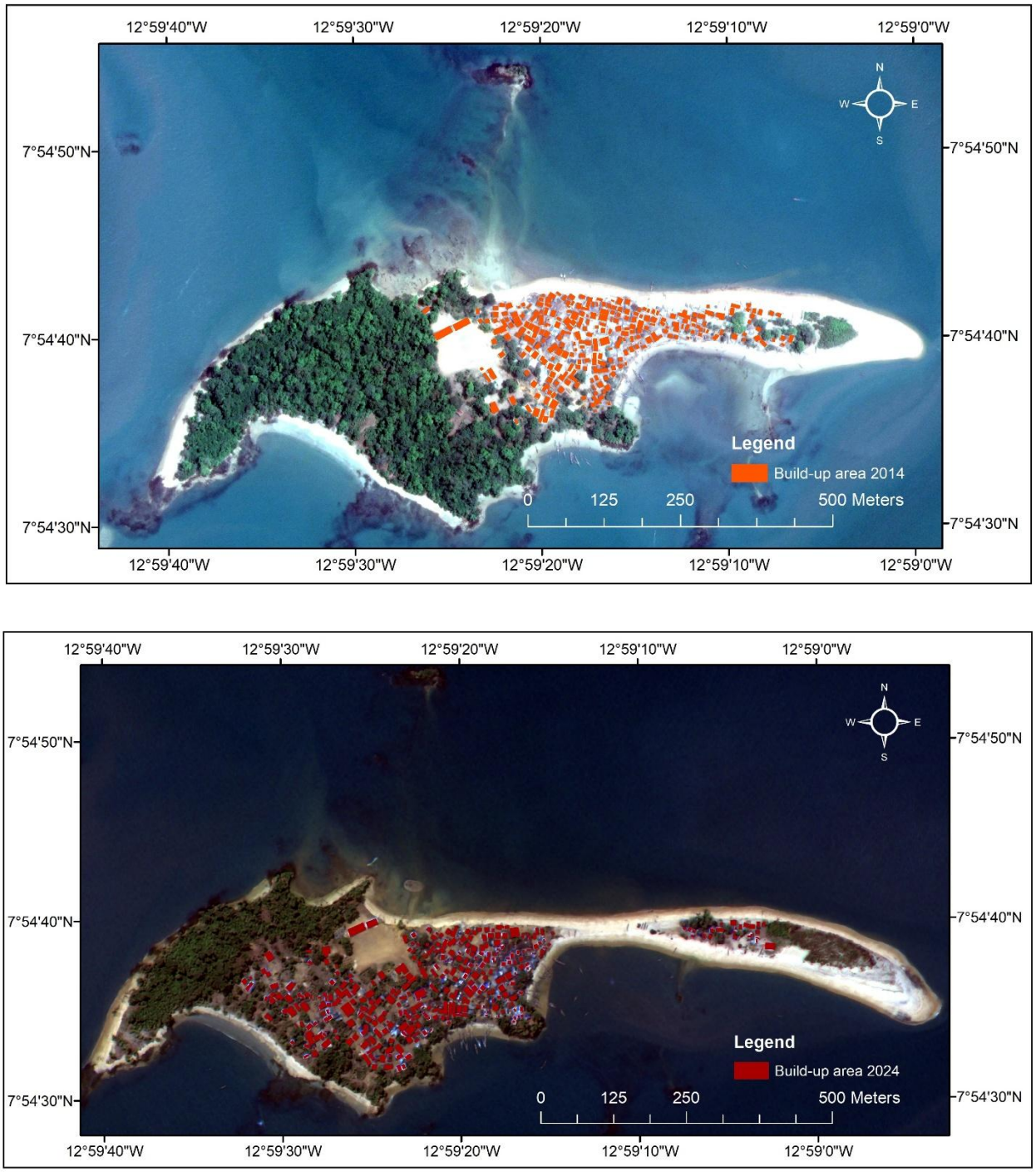


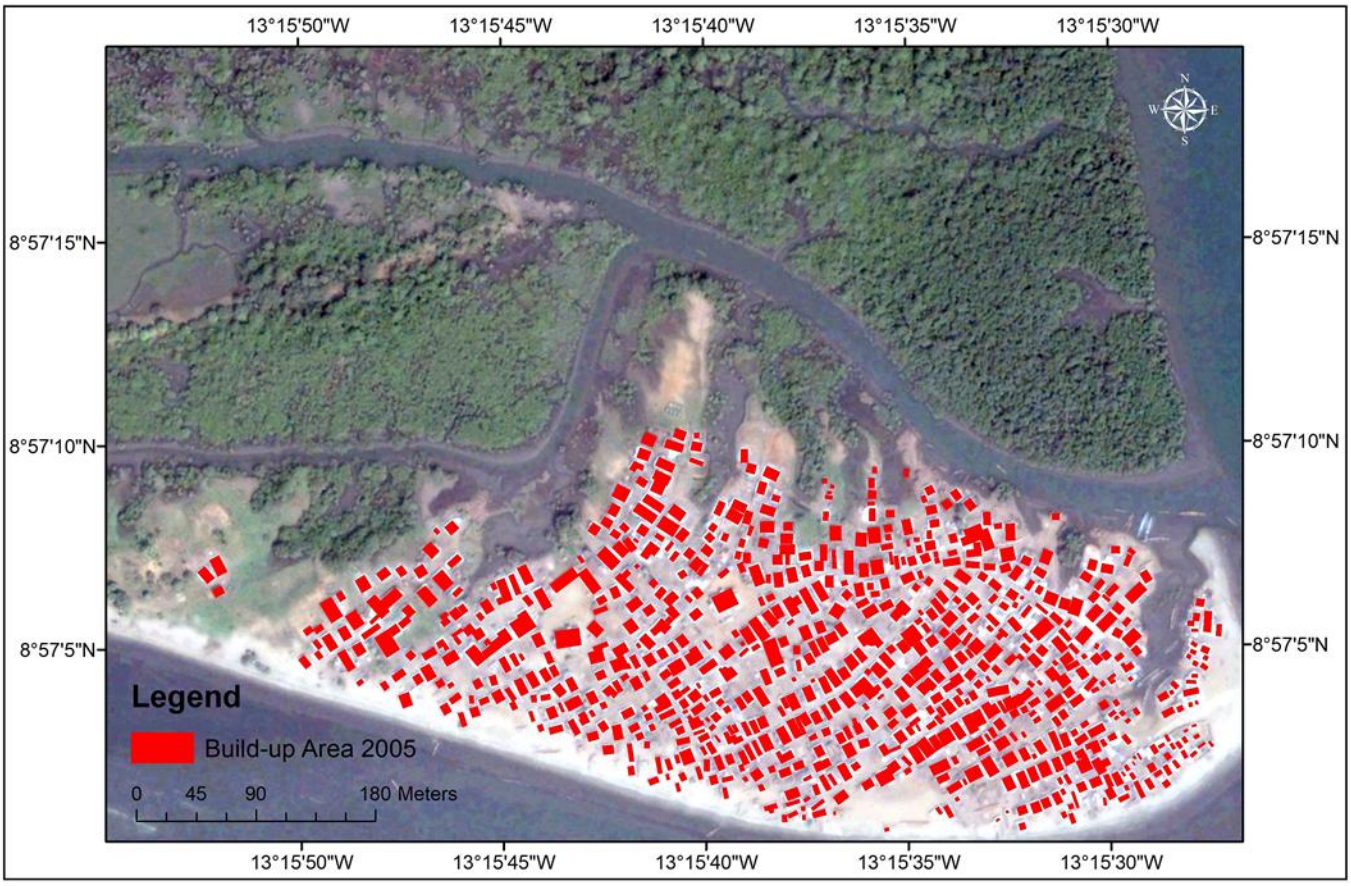
Figure 6. Temporal change in the built-up area, Plantain Island.

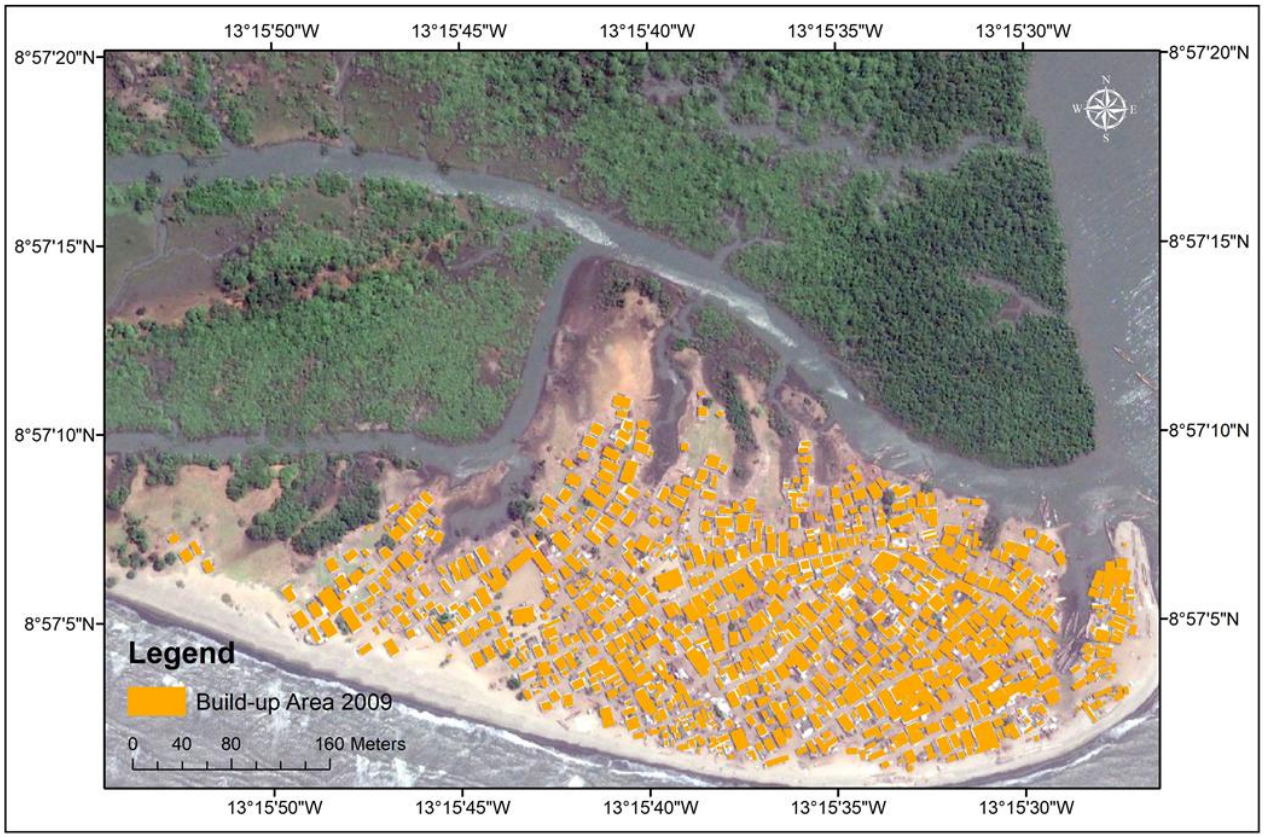
There was an overall increase in the built-up area in Yelibuiya Island between 2005 and 2024 (Figure 7). Unlike the Plantain the infrastructure was not that severely affected. The main loss of infrastructure was on the northern side of the

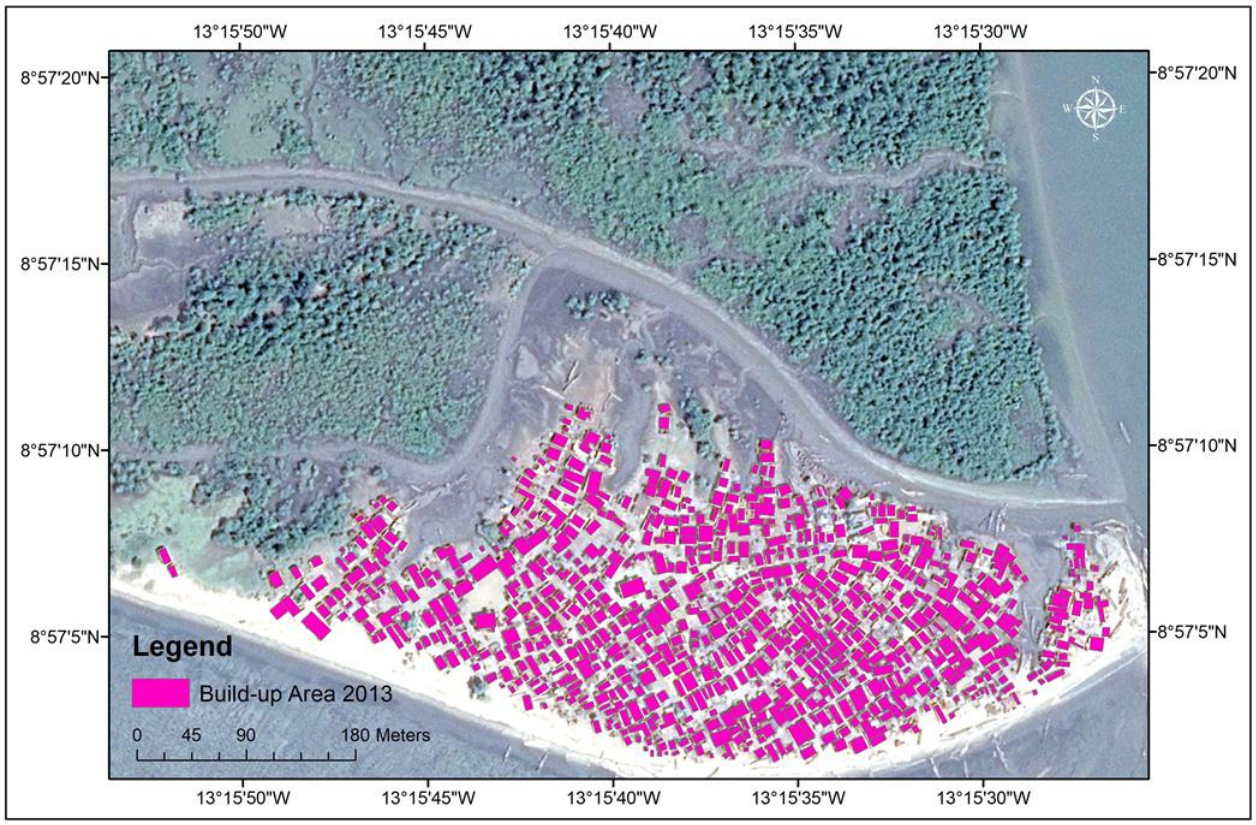
populated area that has inundated dwellings in the vicinity of drainage channels, that was once having mangroves (Figure 7). Temporal changes in built-up areas are summarised in Table 2, showing the number of dwellings increased from 771 in 2005 to 817 in 2024.

Table 2. Temporal trend in buildup area in Yelibuiya between 2005 and 2024

Year	Build-up in sq meters	Build-up in sq kms	% change Build-up area	Building number count
2024	35503.86	0.035	-16.12	817
2017	42326.15	0.042	+1.63	739
2013	41646.99	0.041	-8.04	824
2009	45288.90	0.045	+11.99	905
2005	40440.95	0.040		771




13°15'50"W
13°15'45"W
13°15'40"W
13°15'35"W
13°15'30"W
8°57'20"N
8°57'15"N
8°57'10"N
8°57'5"N
N
W
E
S
Legend
Build-up Area 2009
0 40 80 160 Meters


13°15'50"W
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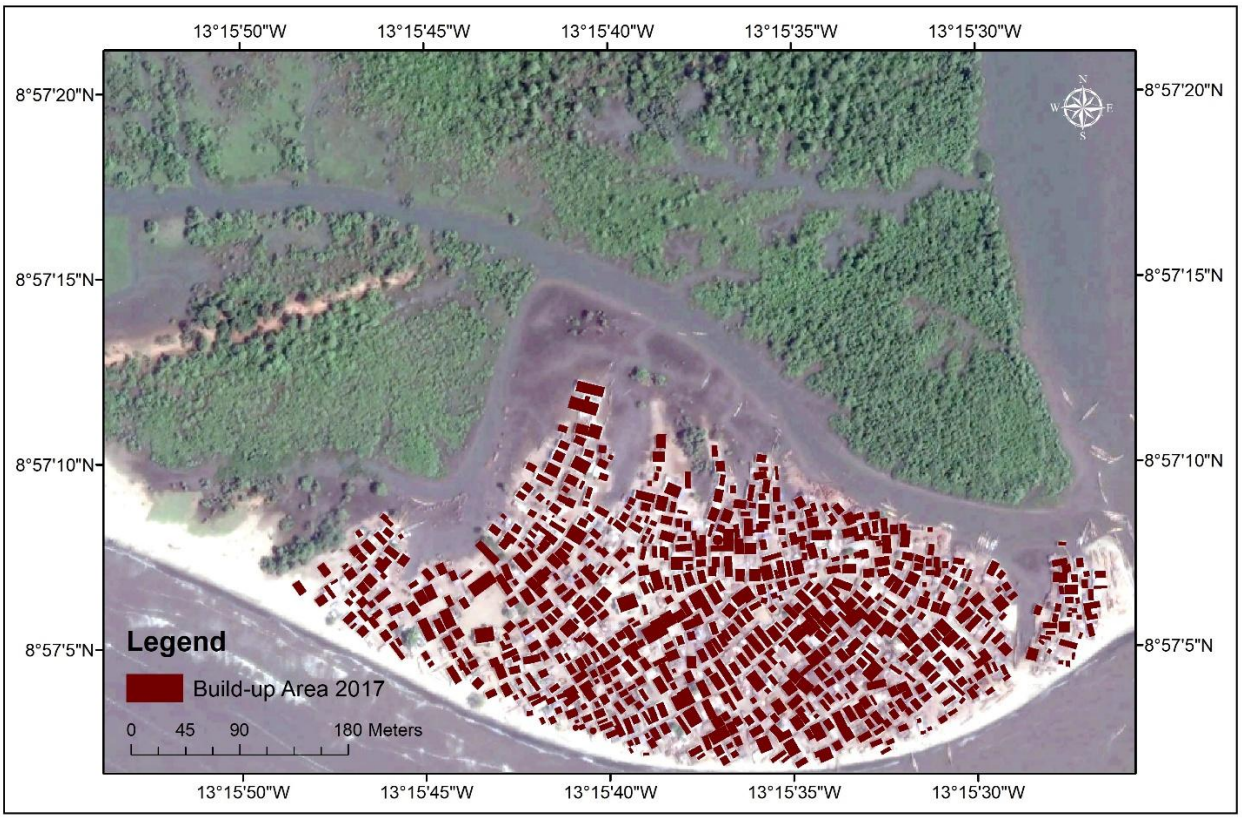
13°15'40"W
13°15'35"W
13°15'30"W
8°57'20"N
8°57'15"N
8°57'10"N
8°57'5"N
N
W
E
S
Legend
Build-up Area 2013
0 45 90 180 Meters



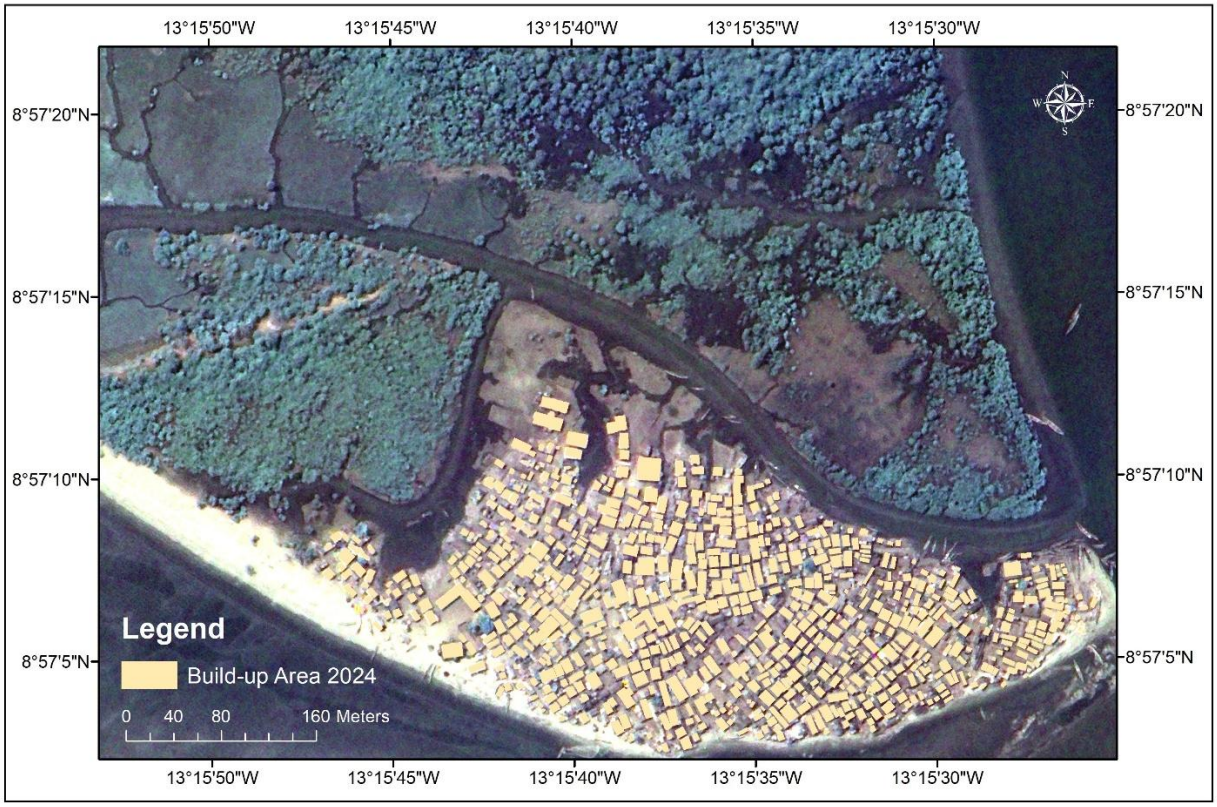


Figure 7. Temporal trends of built-up areas in Yelibuiya Island.

4.1.2 Health Risks:

There are significant health risks on the islands due to the absence of wastewater treatment infrastructure and improper drainage. The issue further exacerbates when flooding and inundation occur leading to the possibility of waterborne disease outbreaks.

4.1.3 Loss of Livelihoods:

The coastal erosion has reduced the areas that could be used for growing crops. The sea level rise and inundation of land have also impacted the limited freshwater availability due to saltwater intrusion.

4.2 Economic Impacts

The economic impacts are colossal from the destruction of dwellings, fishing gear and boats during storms. The continued erosion is limiting the agricultural land cover will increase dependence on food imports. The damage to infrastructure has already led to migration towards the mainland.

4.3 Environmental Impacts

The most significant environmental impact is the loss of limited land on the Plantain Island, inundation in Yelibuiya Island. These effects are not only related to climate change but have a significant anthropogenic contribution, starting with the removal of earth material for construction, and deforestation of mangroves for use as firewood and construction. These mangroves were the natural storm barriers and were often critical for biodiversity.

The other likely impact is with the mobilization of beach material the surrounding water becomes more turbid, which can affect the fish breeding grounds.

The long-term environmental impact is also these mangroves are part of the blue carbon ecosystem. Their destruction will not only impede CO_2 uptake and carbon sequestration but will mobilize what has already been stored.

5.0 Other Vulnerabilities Among Island Communities

5.1 Infrastructure Deficits

The lack of adequate infrastructure on Plantain and Yelibuiya Islands severely hampers the well-being and resilience of the communities. Paved roads are mostly non-existent within the communities. Both islands lack proper healthcare facilities, forcing residents to travel long distances to access medical care, often in life-threatening conditions. Schools are under-resourced, and there is no infrastructure for dealing with municipal waste, both solid and liquid. Furthermore, there is little to no investment in flood-resistant housing and coastal infrastructure to arrest erosion, leaving homes and public spaces vulnerable to recurrent inundation. The lack of proper docking and storage facilities also impacts the livelihoods of fishing communities, as they struggle to protect and repair their boats and equipment after storms. Without immediate investments in resilient infrastructure, these islands will remain highly susceptible to the cascading effects of environmental and socioeconomic vulnerabilities.

5.2 Resource Scarcity

Resource scarcity presents a critical challenge for both Plantain and Yelibuiya Islands, significantly impacting the daily lives of their communities. Freshwater

availability is severely limited due to the salinization of wells caused by seawater intrusion. The lack of proper freshwater management systems forces residents to rely on secondary sources like rainwater harvesting for which no proper infrastructure is available. Import water at high costs, which is unsustainable. Overfishing has drastically reduced local fish stocks, undermining food security and threatening the primary livelihood of fishing-dependent households. Additionally, arable land is shrinking due to erosion, saltwater intrusion and soil degradation, leaving communities with fewer options for subsistence farming. The scarcity of natural resources is compounded by inadequate energy access, as most households lack electricity or rely on expensive, inefficient energy sources. Without addressing these challenges, resource scarcity will continue to hinder the social and economic development of these islands.

5.3 Socioeconomic Inequities

Socioeconomic inequities are a persistent issue on Plantain and Yelibuiya Islands, further deepening the vulnerabilities of their communities. Poverty is widespread, with many families living below the poverty line and lacking access to basic services. Educational disparities are stark, as limited school infrastructure and resources hinder children from achieving higher levels of education, perpetuating cycles of poverty. Women and children are particularly disadvantaged, facing unequal access to healthcare and economic opportunities. Not many women participate in decision-making processes which limits their access to credit and training programs. Addressing these disparities is essential to improving overall community resilience and ensuring equitable growth.

5.4 Governance and Policy Gaps

Governance and policy gaps exacerbate the vulnerabilities of Plantain and Yelibuiya Islands, leaving communities short of the necessary support to address their challenges. The absence of integrated coastal zone management plans is

likely leading to uncoordinated efforts to mitigate coastal erosion and flooding. Funding for disaster preparedness and climate resilience programs is insufficient, further limiting the islands' capacity to respond to and recover from extreme weather events. Additionally, there is a lack of community engagement in decision-making processes, resulting in policies that often fail to address the unique needs of these islands. However, in this effort of EPA-SL and IOM, community engagement has been kept as a key decision point.

Figure 8. Public engagement with stakeholders of Yelibuiya and Plantain Islands.

Weak enforcement of environmental regulations has also contributed to unsustainable practices, mainly mangrove deforestation, which amplify the effects of climate change. Strengthening governance structures and fostering inclusive policymaking are crucial steps toward building resilience and sustainable development.

6. Risk-Based Corrective Action Framework

6.1 Overview of RBCA

Risk-Based Corrective Action (RBCA) is a decision-making framework designed to address environmental risks in a systematic, cost-effective manner [3-5]. On the Plantain and Yelibuiya Islands, this framework is particularly applicable due to their unique challenges, such as coastal erosion, flooding, and limited infrastructure. By prioritizing risks based on their severity and likelihood, RBCA can help identify the most pressing issues, such as the loss of livelihoods and displacement caused by environmental degradation. Tailored solutions, including shoreline protection, mangrove restoration, and flood mitigation systems, can be developed to target these risks effectively. RBCA also enables the efficient allocation of limited financial and technical resources, ensuring that interventions yield maximum impact while considering the islands' socioeconomic constraints and environmental vulnerabilities. It prioritizes interventions based on the severity and probability of risks, enabling the allocation of limited resources to achieve maximum impact.

6.2 Application to Coastal Erosion and Flooding

6.2.1 Risk Assessment:

Risk assessment plays a central role in addressing coastal erosion and flooding on Plantain and Yelibuiya Islands within the RBCA framework. This process involves identifying, quantifying, and evaluating the risks posed by these hazards to human, economic, and ecological systems. In this study, the remotely sensed data was used to assess the change in the coastline on the two islands (Figures 9 and 10).

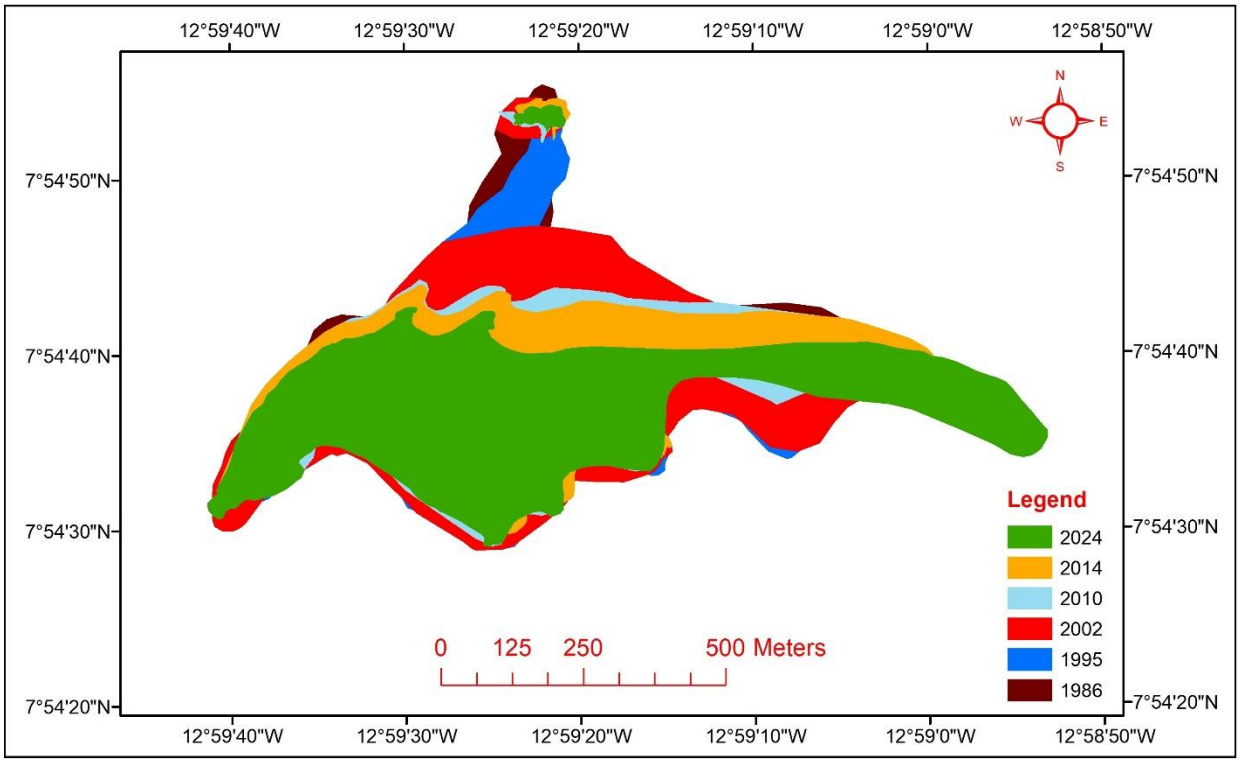


Figure 9. Coastal Erosion on Plantain Island between 1986 and 2024.

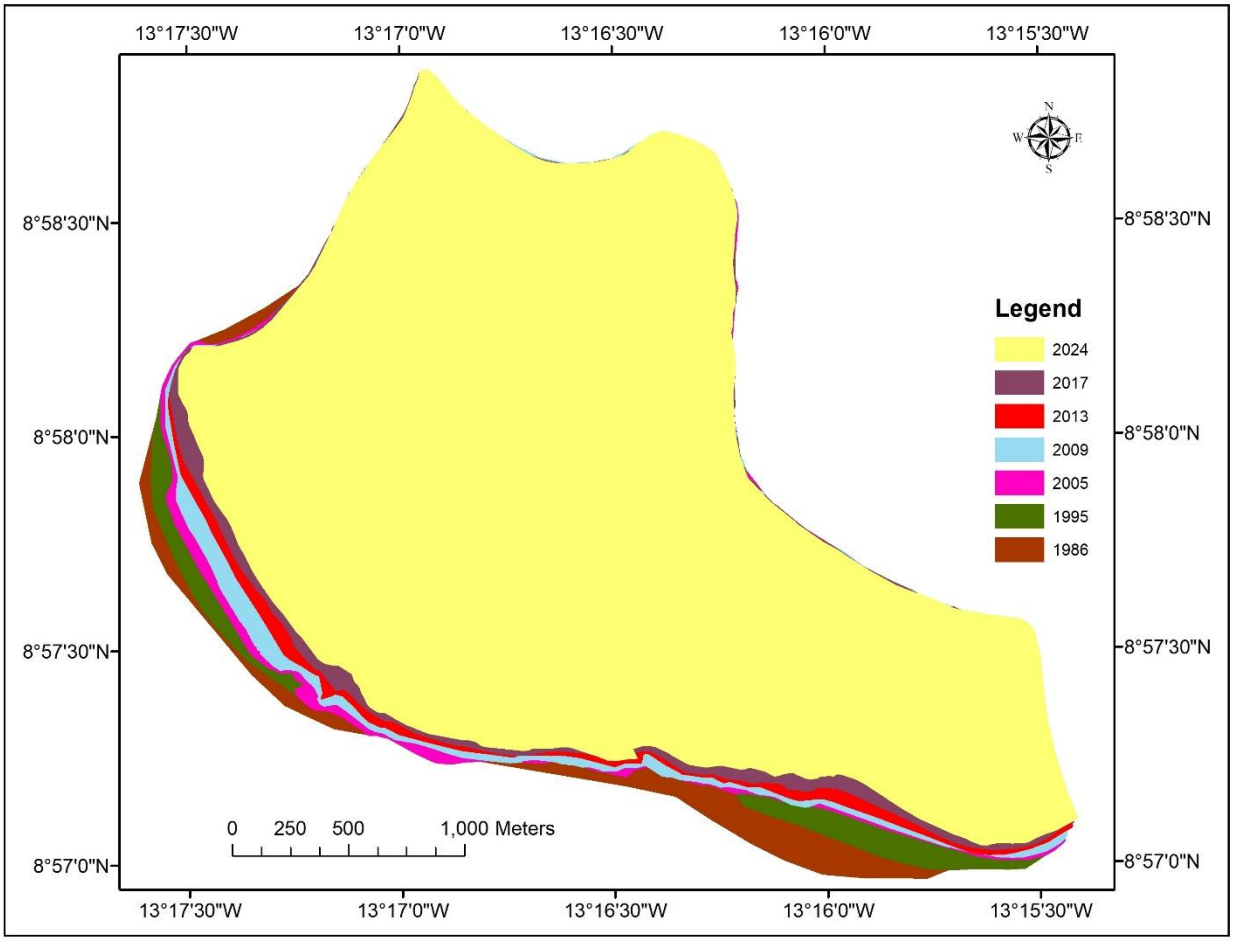


Figure 10. Coastal Erosion on Yelibuiya Island between 1986 and 2024.

Geospatial and hydrological modelling can be used to assess shoreline changes, flood extents, and vulnerable zones. The deforestation of mangroves on both islands accelerated erosion, which serves as natural buffers against storm surges, while inundation disrupts ecosystems and agricultural land, leading to saltwater intrusion and reduced soil productivity. Displacement of populations due to loss of homes and livelihoods further exacerbates socioeconomic instability, straining already limited resources. These tools help pinpoint areas of high exposure, enabling decision-makers to prioritize interventions such as shoreline stabilization, mangrove reforestation, and flood barriers. Additionally, risk assessments can evaluate the potential damage to infrastructure, loss of

livelihoods, and displacement risks under various climate scenarios. By incorporating local environmental data and community feedback, risk assessments ensure that mitigation strategies are context-specific and address the most critical vulnerabilities. This targeted approach not only minimizes costs but also enhances the effectiveness of interventions in building long-term resilience against coastal hazards while protecting the environment and supporting sustainable development.

6.2.2 Risk Management:

Risk management involves implementing targeted mitigation measures to reduce the impacts of coastal erosion and flooding. On Plantain and Yelibuiya Islands, mangrove replantation and the installation of artificial reefs are particularly well-suited due to their ability to address both environmental and socioeconomic challenges. Mangroves act as natural buffers, dissipating wave energy, reducing erosion, and providing vital habitats for fish and other marine species, which directly support local livelihoods dependent on fishing. Artificial reefs, on the other hand, stabilize shorelines while simultaneously restoring marine biodiversity, enhancing food security, and promoting sustainable fisheries. Given the islands' dependence on natural ecosystems, these solutions provide cost-effective, nature-based strategies that align with the communities' capacity and resources. Furthermore, these interventions offer long-term resilience to climate change impacts, such as rising sea levels and increased storm surges, which threaten the islands' habitability and economy. On Plantain and Yelibuiya Islands, strategies such as mangrove replantation and the installation of artificial reefs can significantly enhance coastal resilience. Mangroves serve as natural barriers that dissipate wave energy, reduce erosion, and provide critical habitats for marine biodiversity. Artificial reefs further strengthen this protection by stabilizing shorelines and restoring marine ecosystems. Additionally, establishing early warning systems for floods and storms is vital for protecting

communities. However, given the infrastructure limitations on Plantain and Yelibuiya Islands, implementing such systems requires innovative, low-cost, and community-driven approaches. Solar-powered sirens, mobile phone alerts, and radio broadcasts can be used to disseminate warnings quickly and effectively. These methods are feasible even in areas with limited electricity and connectivity. Additionally, training local volunteers to act as first responders and installing manual rain gauges or tide monitors can ensure the system's effectiveness at the grassroots level. Such early warning systems empower communities to take proactive measures, minimizing risks to life and property despite infrastructural constraints. These systems provide timely information that enables residents to evacuate or take precautionary measures, minimizing loss of life and property damage.

Combining these nature-based solutions with advanced monitoring and early warning systems creates a holistic approach to risk management, fostering long-term resilience while promoting ecological and socioeconomic sustainability.

6.2.3 Risk Communication:

Effective risk communication is essential for ensuring the success of RBCA initiatives on Plantain and Yelibuiya Islands. One of the primary issues to address is the lack of community engagement and awareness about the underlying causes and consequences of coastal erosion, flooding, and climate change. Misconceptions and insufficient information often lead to resistance against proposed mitigation measures. Another challenge is the absence of a systematic approach to disseminating information and engaging local communities in decision-making processes. To overcome these challenges, a participatory planning approach should be adopted, where community members are actively involved in identifying risks and co-developing solutions. Disseminating information on climate risks and resilience strategies through community workshops, local radio programs, and visual aids such as posters and infographics can enhance understanding and foster local ownership of

mitigation efforts. Additionally, establishing a transparent communication channel between stakeholders, including government agencies, NGOs, and local leaders, ensures that critical updates and early warnings are effectively relayed to all residents. Tailoring risk communication strategies to account for the cultural, linguistic, and infrastructural context of these islands will help build trust, enhance preparedness, and encourage active participation in resilience-building initiatives.

I would like to highlight two case studies one from Bangladesh and the other from Maldives. Similar to the Plantainn and Yelibuiya Islands Bangladesh has faced coastal erosion and have successfully implemented risk mitigation strategies to combat the severe impacts of cyclones and coastal erosion, with a focus on cyclone shelters and mangrove restoration. Cyclone shelters, strategically built along vulnerable coastal areas, provide safe havens for thousands of residents during extreme weather events. These multi-purpose structures are designed to accommodate large groups, often serving as schools or community centres during non-emergency periods. The establishment of these shelters has significantly reduced cyclone-related fatalities and injuries. In parallel, mangrove restoration projects, particularly in the Sundarbans region, have proven to be an effective nature-based solution. Mangroves act as natural barriers, reducing storm surges and protecting inland communities from flooding and erosion. Restoration efforts include replantation drives and community-led conservation programs, ensuring the long-term survival of these critical ecosystems. By integrating infrastructure development with ecological preservation, Bangladesh demonstrates a holistic approach to risk mitigation that balances human safety and environmental sustainability. On the other hand, the Maldives, one of the most climate-vulnerable nations globally, has adopted innovative measures to combat rising sea levels, including the construction of artificial islands and seawalls. Artificial islands, such as Hulhumalé, are engineered to be elevated above current sea levels, providing safe zones for housing and economic activities while addressing land scarcity. These islands incorporate climate-resilient designs, including flood-resistant

infrastructure and renewable energy systems. Additionally, seawalls have been constructed around many inhabited islands to protect against coastal erosion and tidal surges. These structures absorb wave energy, reducing the impact of flooding on low-lying areas. While expensive to implement, seawalls and artificial islands are vital for safeguarding the Maldives' population and economy. Both measures demonstrate the country's commitment to innovative, adaptive solutions that ensure long-term resilience against climate change-induced threats. Similar structures can be costructed in Plantain Island to not only reduce erosion but to enable deposition by bringing down the later currents that erode the north of the island.

7. Recommendations

The recommendations have essentially been divided into short, medium and long-term time scales.

7.1 Short-Term Actions

In the short term, immediate actions should focus on addressing critical vulnerabilities to reduce the risks posed by coastal erosion and flooding. For both islands, the following measures are recommended:

7.1.1 Mangrove Protection and Rapid Replantation:

Initiate mangrove restoration projects by protecting existing mangroves and planting fast-growing mangrove species in vulnerable areas to provide immediate natural defences against erosion and storm surges

7.1.2 Community Flood Barriers and Sandbagging:

Construct temporary flood barriers and distribute sandbags to vulnerable coastal areas to minimize flood damage to households during the rainy season and high tides.

7.1.3 Establishment of Emergency Shelters:

Convert existing community buildings into temporary emergency shelters equipped with basic supplies, ensuring safe refuge during storms or flooding events.

7.1.4 Basic Infrastructure Repairs:

Repair critical infrastructure such as roads and tracks, small docks, and drainage systems to enhance mobility and reduce immediate exposure to flooding.

7.1.5 Early Warning Systems:

Deploy simple and affordable early warning systems, such as radio-based alerts and community sirens, to provide timely warnings for storms and flooding events. The district authorities should be alerted as well to be ready to mobilize resources to support.

7.1.6 Awareness Campaigns:

Conduct community awareness campaigns to educate residents on climate risks, disaster preparedness, and emergency response actions.

7.1.7 Water Resource Management:

Install temporary rainwater harvesting systems and distribute portable water purification kits to address freshwater scarcity caused by saltwater intrusion.

7.1.8 Livelihood Support:

Provide short-term financial or material assistance to fishing and farming households affected by the loss of equipment or arable land, enabling them to recover quickly from recent environmental shocks.

By implementing these short-term measures, Plantain and Yelibuiya Islands can reduce immediate risks, protect lives, and lay the groundwork for longer-term resilience and sustainable development.

7.2 Medium-Term Actions

The mid-term recommendations for Plantain and Yelibuiya Islands

7.2.1 Development of Comprehensive Land-Use Plans Incorporating RBCA Principles:

In the medium term, developing comprehensive land-use plans based on RBCA principles is crucial to sustainably managing the islands' vulnerabilities. These plans should prioritize zoning regulations that discourage construction in high-risk coastal areas prone to erosion and flooding while designating safer zones for residential and economic activities. By integrating geospatial and hydrological data, the plans can map critical habitats like mangroves and allocate areas for their restoration and protection. Additionally, these land-use plans should account for future climate change scenarios to ensure long-term viability. Engaging local communities in the development process will ensure alignment with their needs while fostering a sense of ownership and compliance. These plans should also integrate disaster risk reduction strategies, such as creating buffer zones and greenbelts, to enhance resilience against future environmental challenges.

7.2.2 Invest in Resilient Infrastructure

Mid-term actions should include significant investments in resilient infrastructure to protect the islands' communities from the increasing impacts of climate change. Elevated housing designed to withstand flooding and storm surges can provide safer living conditions, reducing displacement risks. Similarly, constructing raised roads with proper drainage systems will improve connectivity and access during extreme weather events, preventing the isolation of communities during floods and saving infrastructure. Other critical infrastructure, such as reinforced docks and storage facilities for fishing boats and equipment, should also be developed to support livelihoods and economic stability. Investments in renewable energy sources, such as solar microgrids, can provide reliable power to areas lacking electricity, while simultaneously reducing reliance on environmentally damaging fuels. These resilient infrastructure

projects will not only mitigate the risks posed by climate events but also contribute to the islands' socio-economic development by creating jobs and boosting local economies.

7.3 Long-Term Actions

The long term strategy should focus on the development of resilience and development of an enriched ecosystem.

7.3.1 Establish Marine Protected Areas and Coastal Zones

In the long term, establishing marine protected areas (MPAs) and designated coastal zones is essential to safeguard the ecological integrity of the Plantain and Yelibuiya Islands while ensuring sustainable resource use. MPAs can protect vital marine ecosystems, such as mangroves, which act as natural barriers against coastal erosion and storm surges. By restricting harmful activities such as overfishing, dredging, and deforestation, these protected zones will enhance biodiversity, stabilize ecosystems, and support the livelihoods of local fishing communities. Additionally, designated coastal zones can regulate land use along vulnerable shorelines, discouraging unsustainable construction while promoting eco-friendly practices. A well-defined zoning strategy should balance conservation objectives with community needs, ensuring that both environmental and socioeconomic priorities are met. Continuous monitoring and enforcement of these zones, supported by local and regional authorities, will be critical to maintaining their effectiveness over time.

7.3.2 Secure Funding for Large-Scale Adaptation Projects through International Grants and Partnerships

Long-term resilience for Plantain and Yelibuiya Islands requires sustained financial investment in large-scale adaptation projects. International grants and partnerships, such as those offered by the Green Climate Fund (GCF), the Global Environment Facility (GEF), Kuwait Fund, Qatar Fund, and bilateral donors, present significant opportunities to secure funding. These resources can support

transformative initiatives such as the construction of seawalls, large-scale mangrove reforestation, and advanced flood defense systems. To attract funding, a robust proposal framework must be developed, emphasizing the islands' unique vulnerabilities and aligning project goals with global climate adaptation and sustainable development priorities. Building partnerships with international NGOs, research institutions, and private sector actors can further enhance access to technical expertise and financial resources. A transparent governance structure for managing funds will ensure accountability and foster trust among stakeholders, paving the way for long-term, impactful adaptation efforts that protect both the environment and the livelihoods of island communities.

8 Conclusion

This Risk-Based Corrective Action (RBCA) report has thoroughly analyzed the vulnerabilities of the Plantain and Yelibuiya Islands, highlighting the critical threats posed by coastal erosion, flooding, and climate change. The environmental challenges have profound social and economic implications, including displacement, habitat destruction, loss of livelihoods, and heightened public health risks. These issues are further exacerbated by governance and policy gaps, inadequate infrastructure, resource scarcity, and entrenched socioeconomic inequalities. The RBCA framework has proven to be an effective tool for prioritizing these risks and guiding the development of context-specific interventions.

Key observations from this study include:

1. An urgent need to address environmental degradation, particularly the loss of mangroves and other natural buffers, which are critical to mitigating storm surges and erosion.

2. The socioeconomic challenges faced by communities include limited access to basic services, education, and healthcare, as well as resource scarcity and widespread poverty.
3. Infrastructure deficits amplify vulnerabilities, such as poorly maintained roads, inadequate housing, and the absence of robust flood defence systems.
4. The lack of community engagement and systematic risk communication hinders the effective implementation of resilience strategies.

To address these challenges, the report provides actionable recommendations across short-, mid-, and long-term horizons:

- **Short-term actions**: Focus on immediate risk mitigation, including mangrove replantation, artificial reefs, and the establishment of early warning systems for floods and storms. These measures will provide immediate relief while laying the groundwork for long-term resilience.
- **Mid-term actions**: Develop comprehensive land-use plans that incorporate RBCA principles and invest in resilient infrastructure, such as elevated housing and roads. These actions will address the root causes of vulnerability and create sustainable pathways for development.
- **Long-term actions**: Establish marine protected areas and coastal zones to safeguard biodiversity and natural defences while securing international funding and partnerships for large-scale adaptation projects. These initiatives will ensure the long-term ecological and socioeconomic stability of the islands.

Central to these recommendations is the active engagement of local communities in the planning and implementation processes. Participatory risk communication strategies, supported by transparent governance, will ensure that solutions are culturally appropriate and widely accepted. Advanced monitoring systems and regular assessments must be integrated into all stages

of the RBCA framework to adapt to changing environmental conditions and ensure continuous improvement of implemented strategies.

By adopting these measures, Plantain and Yelibuiya Islands can transition from their current state of vulnerability to become resilient communities, capable of thriving amidst the challenges of climate change. The recommendations outlined in this report provide a holistic pathway to safeguard the livelihoods, ecosystems, and cultural heritage of these islands, ensuring a sustainable future for generations to come.

9. References

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